MEMORANDUM CH2MHILL

King County Tabula: Task 2-Identify and Add Additional Unit Costs

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This memorandum pertains to Work Order #9 of King County Wastewater Treatment Division for revisions and updates to their "Tabula" Cost Estimating Program. Specifically, this memo discusses Task 2, to Identify and add additional unit costs to Tabula.

While the current Tabula program tries to capture as many project costs as is practical, it is recognized that the program can be improved by adding additional unit cost items. In discussion with King County CH2M HILL has suggested changes that could be made under this current effort and will also recommend additional changes that King County should explore in the next Tabula update.

The top priority for King County was to address the disposal costs of waste materials removed from site. Finding a location for contractors to dispose of waste materials is becoming more difficult as current locations are filled and the county becomes more urbanized. Contractors often have to pay to dispose of even clean materials. Also King County is aware that certain locations in the county may potentially contain contaminated waste in the soils. While estimates done in Tabula normally don't have soil borings or geotechnical information, educated assumptions about contaminates can be made from other projects preformed in the area. Since modification to the JAVA program turned out to be unpractical at the time of the work the drop down menu with the choice of trench backfill material type was modified for the pipeline costs. The two choices of either native or import backfill material have been expanded. In addition to each of these a notation was added to expand the choices to be Native or Import: No disposal cost, common earth disposal, and contaminated earth disposal. Waste materials containing contaminates that can not be disposed of locally are out of the scope of the program. The user must carefully consider these contaminant disposal costs and do further research into where the material will need to be transported and disposed of and what costs are involved for this. Depending on the users selection an additional unit cost will be added to the $12/CY spoil load and haul cost currently contained in the Tabula program to capture the cost of the disposal fees that the contractor will have to pay for the waste materials. The suggested disposal costs for these materials are shown in Table 1. All costs are in cubic yard of waste material and are given in

September 2005 dollars at an ENR CCI Index of 8390. These costs were arrived at in consultation with Pam Badger in the King County Solid Waste Division. Disposal of contaminated materials through King County was $136.75 per ton. To convert waste material costs from tons to cubic yards a factor of 1.65 tons per cubic yard was used for the material conversion.

Table 1. Earthwork Waste Disposal Unit Costs

Disposal Material Cost Descriptions	Recommended Disposal Unit Cost $/CY (September 2005, ENR CCI 8390)	Total Waste, Haul and Disposal Unit Cost $/CY (September 2005, ENR CCI 8390)
None	$0	$12
Common Earth Disposal	$5	$17
Local disposal of contaminated materials	$225	$237

In addition to the disposal costs for waste materials, CH2M HILL would also propose the King County investigate several other additions to the Tabula program during its next update. One item that could be expanded is the shoring costs. Currently shoring has two options: standard and special shoring. Standard shoring methods include a trench box, while special shoring cost are more indicative of the contractor using sheet pile shoring. It is proposed that a new category be added which would fill the gap between trench box shoring and sheet piles. This "moderate" shoring cost would be used for locations where the contractor might use rented slide rail shoring or steel sheets with hydraulic jacks.

Also sometimes due to shallow depths or load considerations pipe under the roadway may need to have CDF bed and zone materials. It is recommended that Tabula have an option for the user to choose either imported granular material or CDF for the pipe bed and zone.

The dewatering options in Tabula could also be expanded to allow the user more flexibility. Currently the user has three options: None, minimal, and significant. Dewatering can be a major cost issue depending on what steps the contractor must take to mitigate groundwater issues. We propose that the user be allowed to choose from sump pumps in the trench, dewatering wells and wellpoints on one side of the trench, and wellpoints on both sides of the trench.

The last area that we would propose modifying is the sewer pipe materials and installation costs. Tabula currently allows for three types of materials: gravity sewer pipe, force mains, and high head force mains. Class V reinforced concrete pipe (RCP) is used for gravity pipes, Class 53 Tyton Joint ductile iron is used of the force mains, with restrained joint ductile iron pipe being used for high head applications. It is recommended that other pipe materials be added to the Tabula pipe options. Specifically it is recommended that both PVC gravity pipe and PVC force mains be added to the user's options for pipe materials. PVC is a commonly used pipe material for sewer line applications.

The installation costs for Tabula should also be modified. Currently the installation cost for all types of pipes of the same diameter is the same installation cost. It is recommended that installation costs be determined separately for each type of pipe since they are not installed with the same crews or production rates.

One area of concern is the way that trenchless technology costs are calculated when the cased pipe option is used. Currently when the user indicates that the pipe will be cased the Tabula program will automatically upsize the microtunnel, bore & jack and horizontal directional drilling (HDD) costs to the appropriate size for the casing. Then an additional cost is placed on the trenchless technology for the carrier pipe material. The problem is that the trenchless technology costs already include the costs of the material for the jacked pipe. Thus if the user decided to place a 12″ carrier pipe inside a cased pipe, Tabula will automatically increase the size of the microtunnel to 24″ diameter. This 24″ microtunnel cost already includes the 24″ jacking pipe or casing in this case. Thus is you then add the material cost for the 24″ casing on top of this cost you doubling your costs for casing materials. The user still has not taken into account for the carrier pipe inside the cased pipe. A simple solution is to change the descriptor so that instead of additional cost for the casing material this will now add in the cost of the carrier pipe inside of the casing. This will be labeled as the casing carrier pipe cost. By doing this the output will now give the total costs for the microtunnel, bore & jack and HDD including the carrier pipe. This is also typically how the piece would be bid with all costs from portal to portal included in the bid item.